14B

12

15

Airflow

20G

20E
20F

20D
1AB
20C
20B
20A
16

10

Figure 1

17

13

24

20C

20B

20A
16

14A

20G

20D 20E
20F

16

20

20

Archival Magazine
High Density

Figure 2A

12A

15

17

14D

7

13

14C

20D
20N
20M
20L
20K
20J
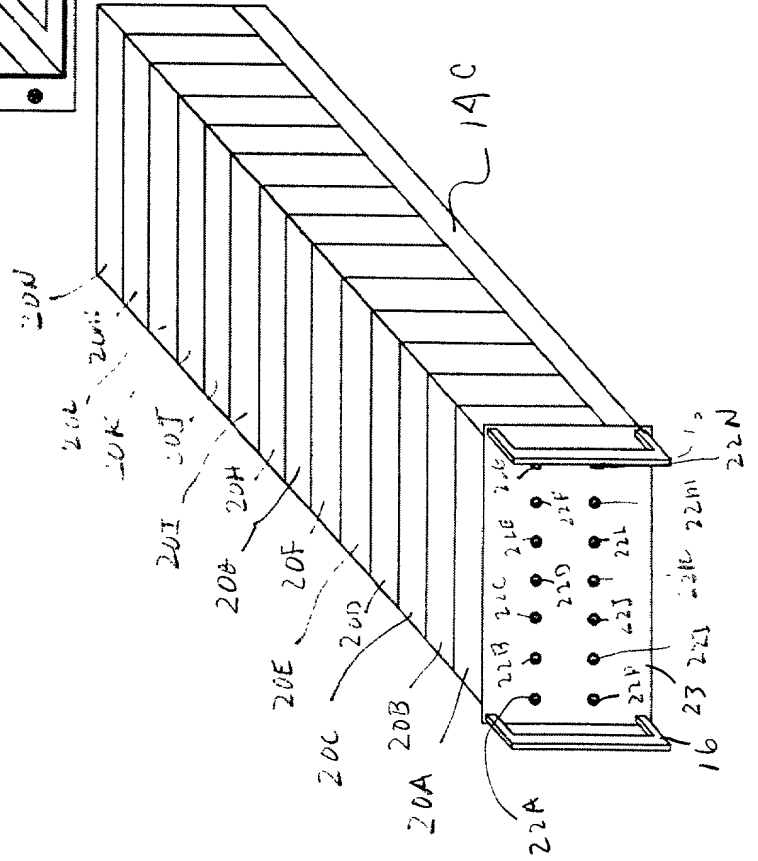20I
20H
20G
20F
20E
20D
20C
20B
20A

22A
16
23
22A
22B
22C
22D
22E
22F
22G
22H
22I
22J
22K
22L
22M
22N

Archival Magazine
High Density

20

12A

2A

20

2A

23

23

Airflow

Figure 2B
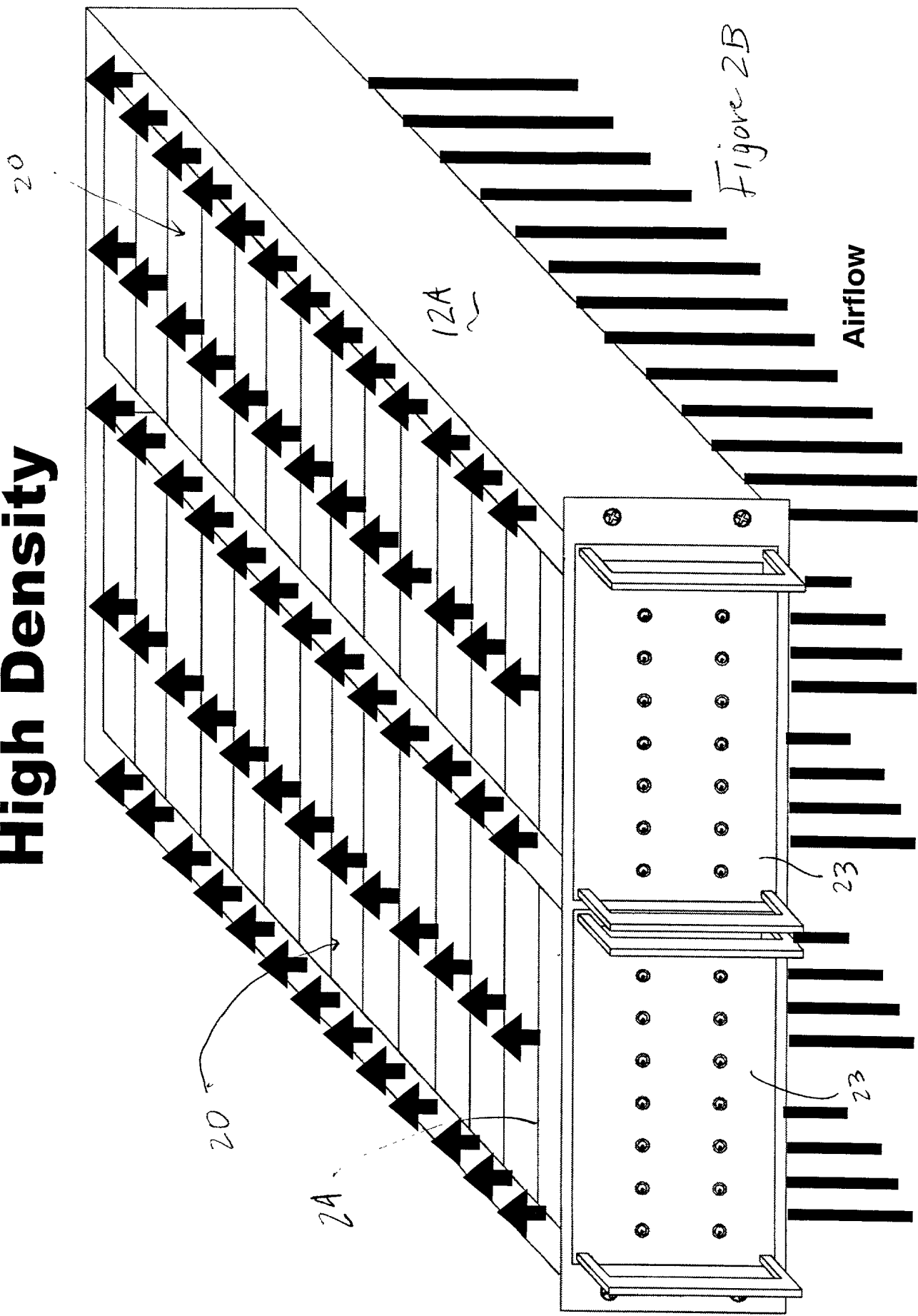
Active Data Storage Array with Serial ATA

SCSI Host

SCSI Target

Serial ATA Host Controller (×8)

Serial ATA Connector

Serial ATA Drive (20A–20G)

Drive Power Switched by Command

48V to 5V and 12V DC to DC Converter

Power Connector

Power Switch Command All Drives On To Power Supply

Figure 3A

Uses all drives simultaneously to store data
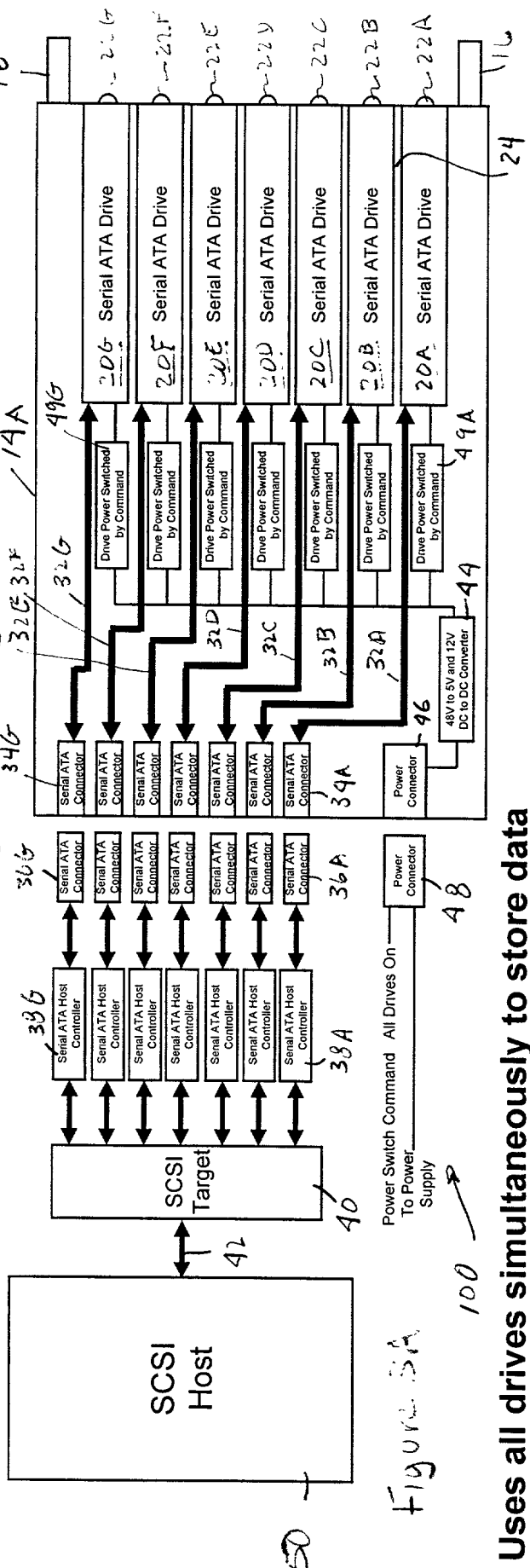
Data Preservation Vault with Serial ATA

Drive Monitoring System

Serial ATA Connector

Serial ATA Drive (20A–20G)

Drive Power Switched by Command

48V to 5V and 12V DC to DC Converter

Power Connector

Power Switch Command One drive at a time To Power Supply

Figure 3B

Uses only one drive at a time for monitoring or retrieving data
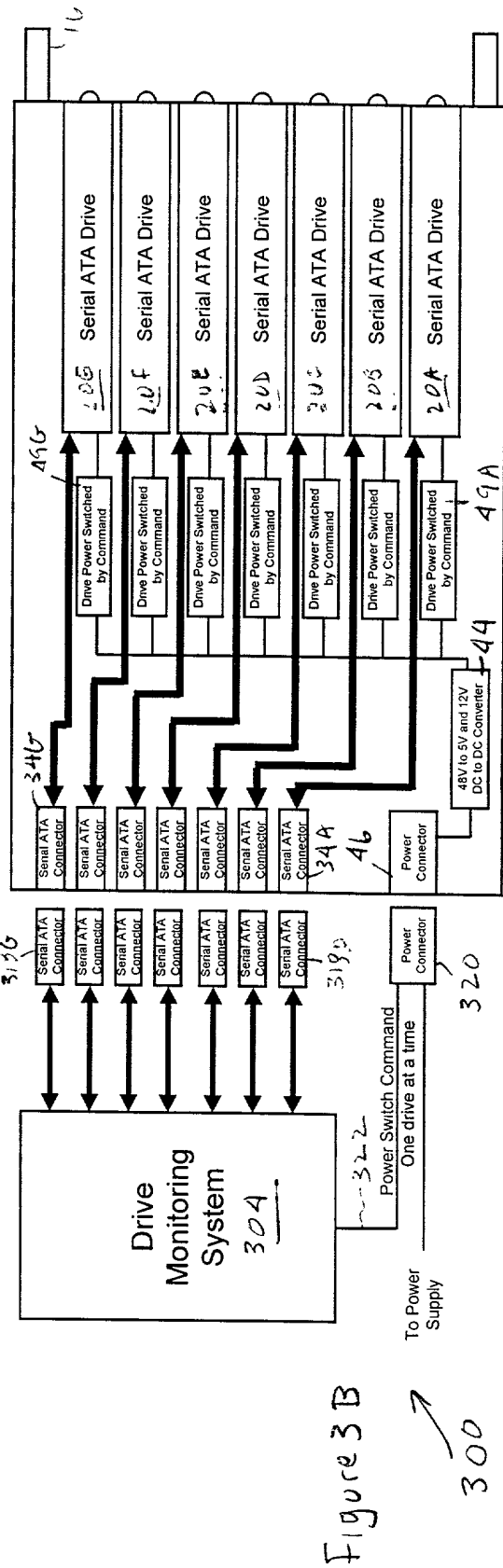
Active Data Storage Array with USB 2.0

2560Mb/s

Uses all drives simultaneously to store data

Figure 4A

Data Preservation Vault with USB 2.0

480Mb/s
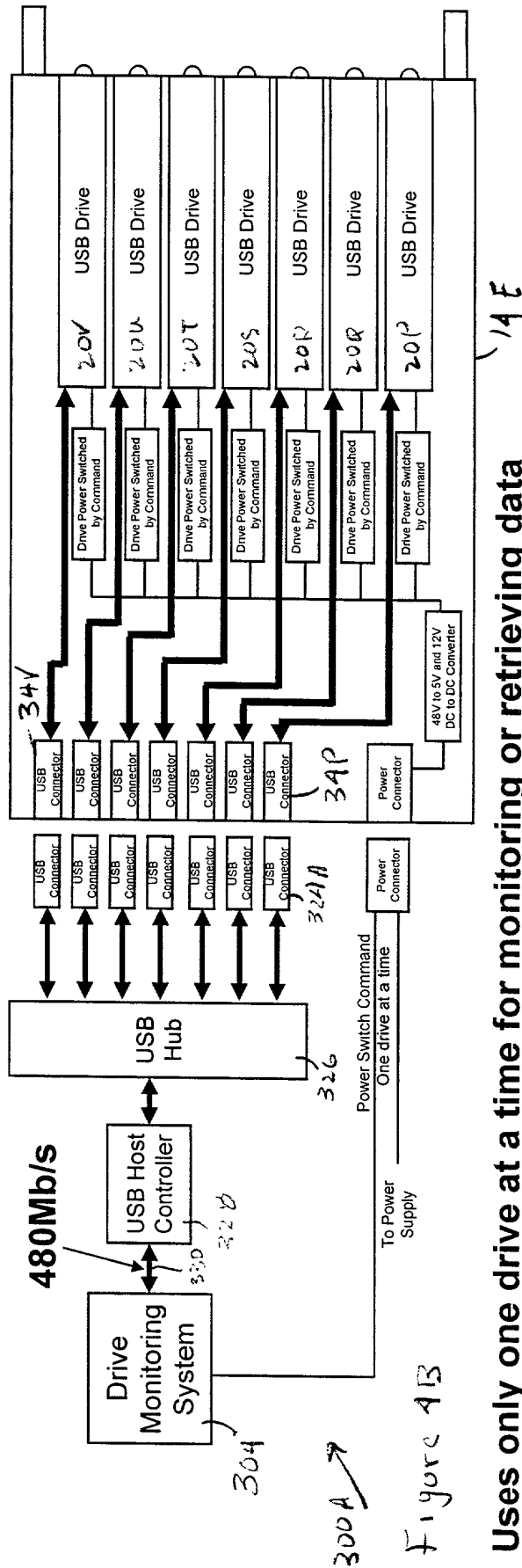
Uses only one drive at a time for monitoring or retrieving data

Figure 4B

Archival Cartridge
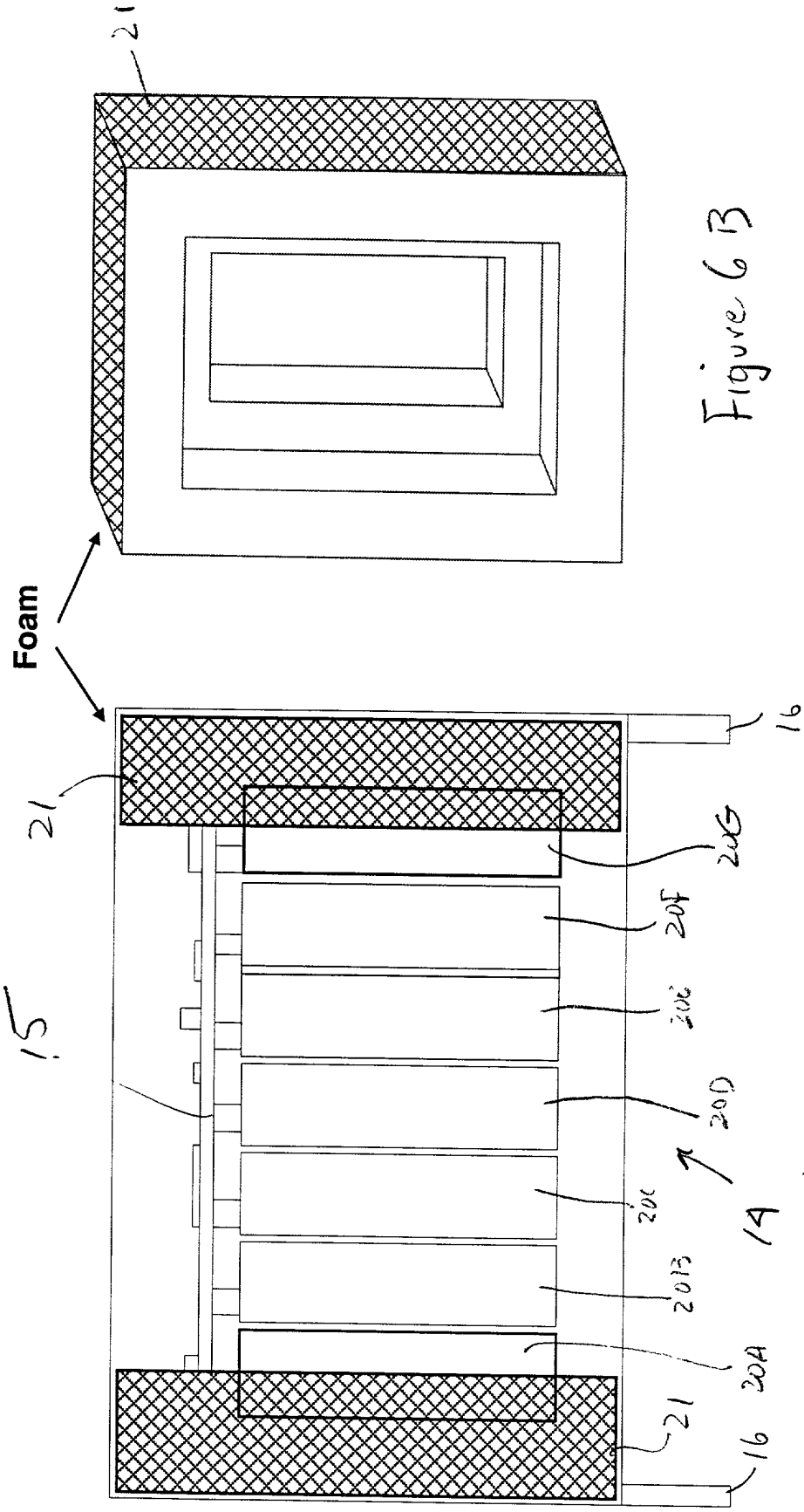## IEEE 1394 Interface
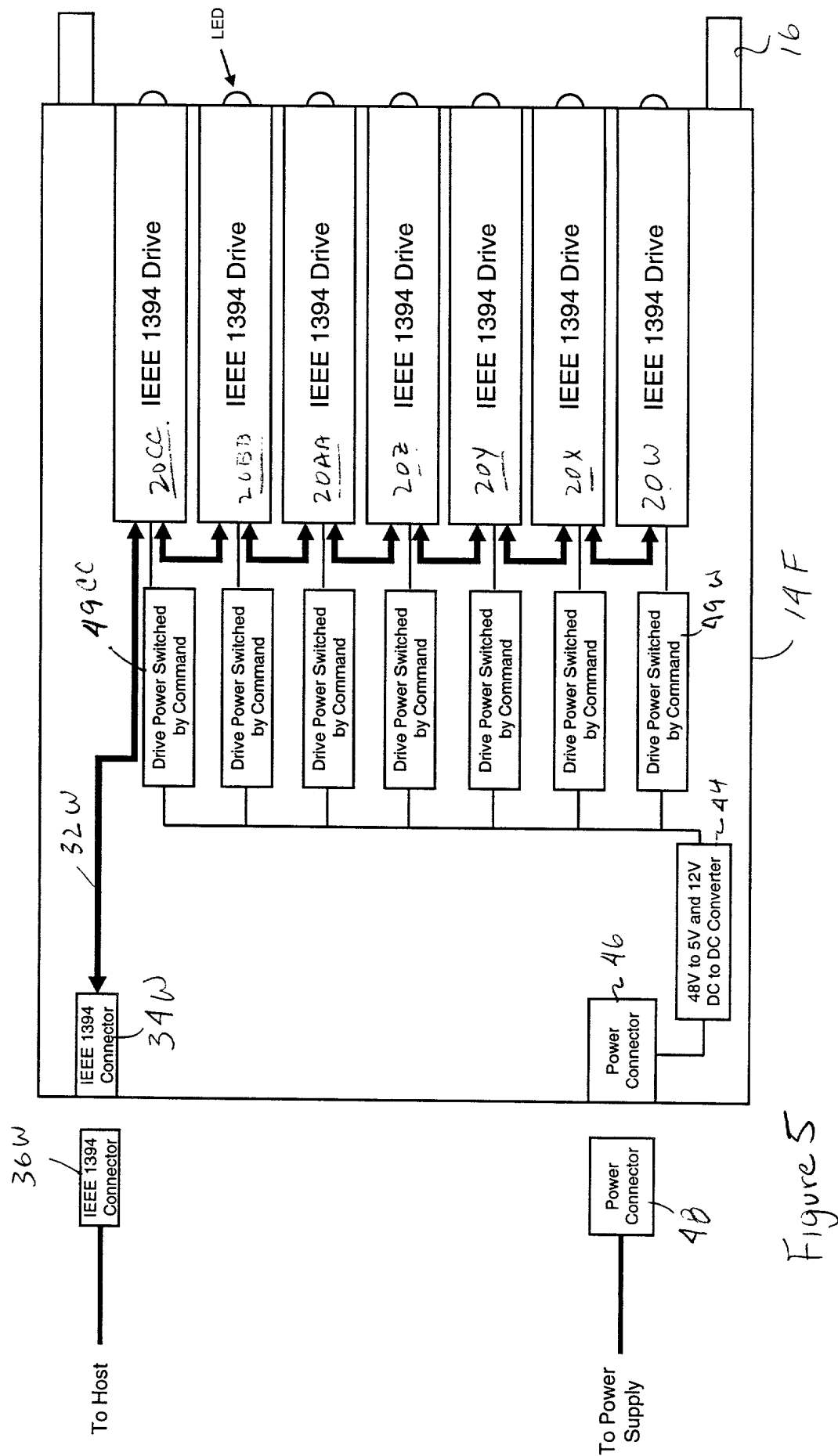
Figure 5

Shock Protection
for Archival Magazine

Foam

15

21

16 20A

20B

20C

20D

20E

20F

20G

16

21

Figure 6A.

16

21

Figure 6B

Active Data Storage Array
High Speed High Storage

Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay
Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay
Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay
Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay
Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay
Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay
Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay	Disk Drive Hot Swap Bay

Monitor 104

Host

Main Board 102

ATA USB Serial ATA or IEEE 1394 Controller 40

Power Supply 106

102A 102B 102C 102D 102E

50 100

Figure 7

Active Data Storage Array

From SCSI Host

Figure 8

Active Data Storage Array

Airflow

Fans

101

102

14

20

Ventilated Raised
Floor Tiles
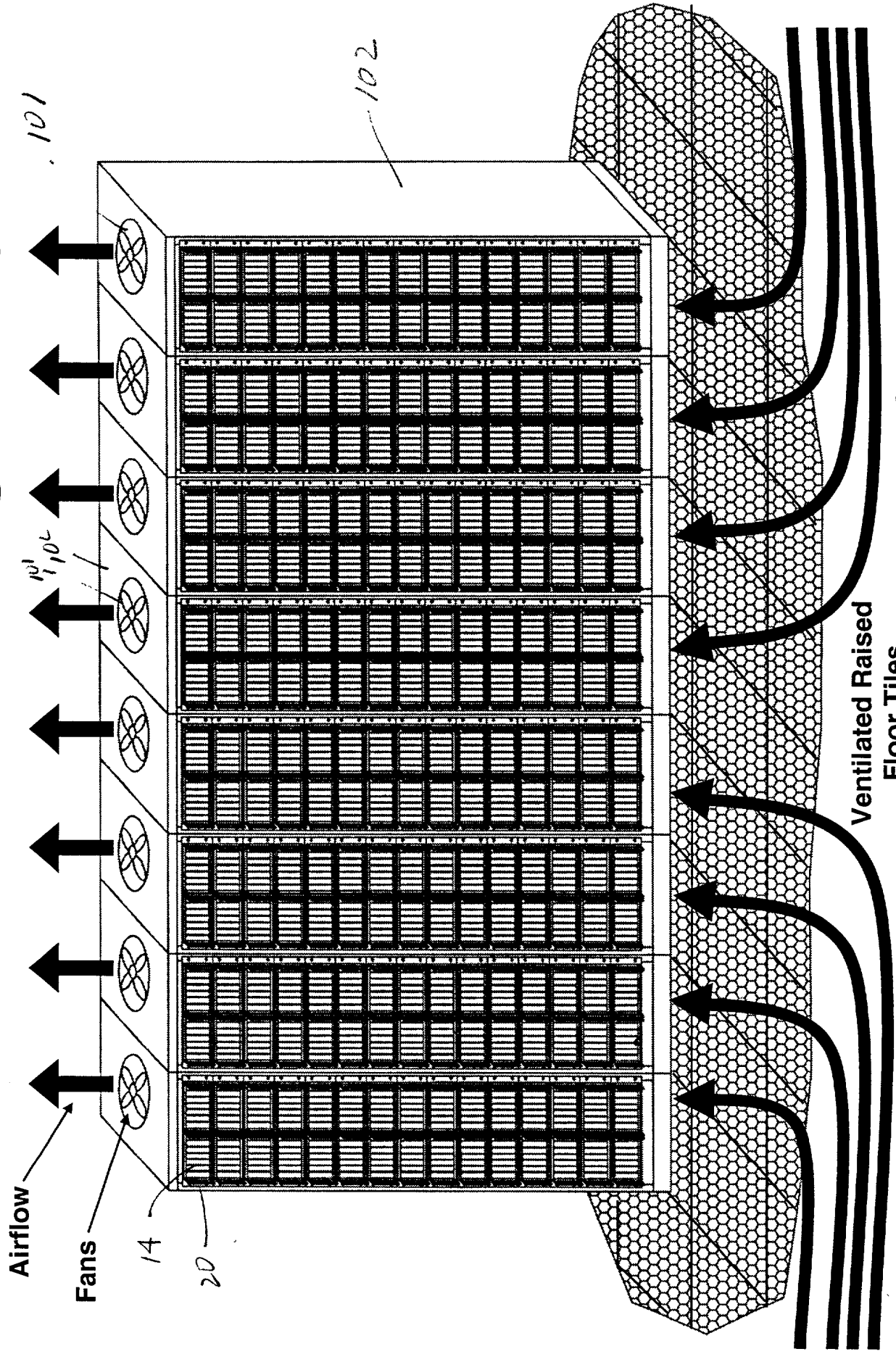
Figure 9

**Shock-Insulated
Transport Case**

200

202

204B

204A

210B

206

208

210A

Figure 10

Data Preservation Vault
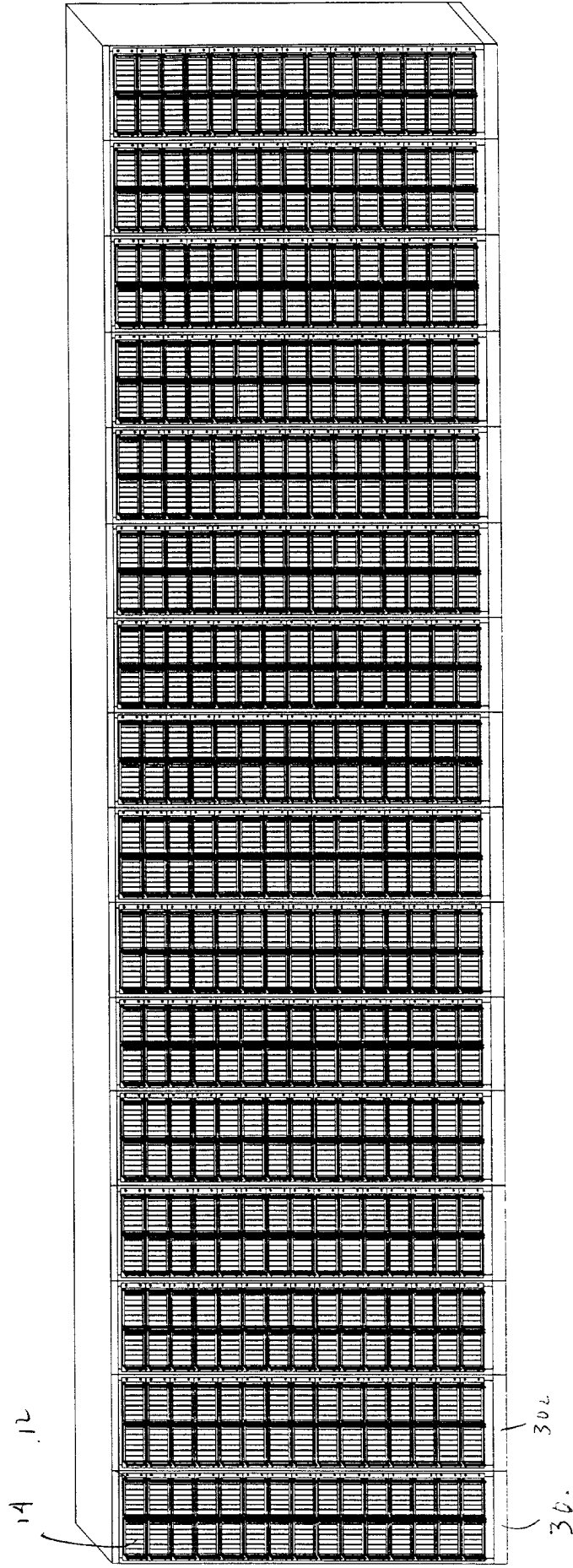
Figure 11

Data Preservation Vault
(top view)

To Remote Operator Console

Power Supply

Disk Monitoring System

Temperature and Humidity Sensors

Replacement Drives

Archival Cartridges

310

304

306

308

300
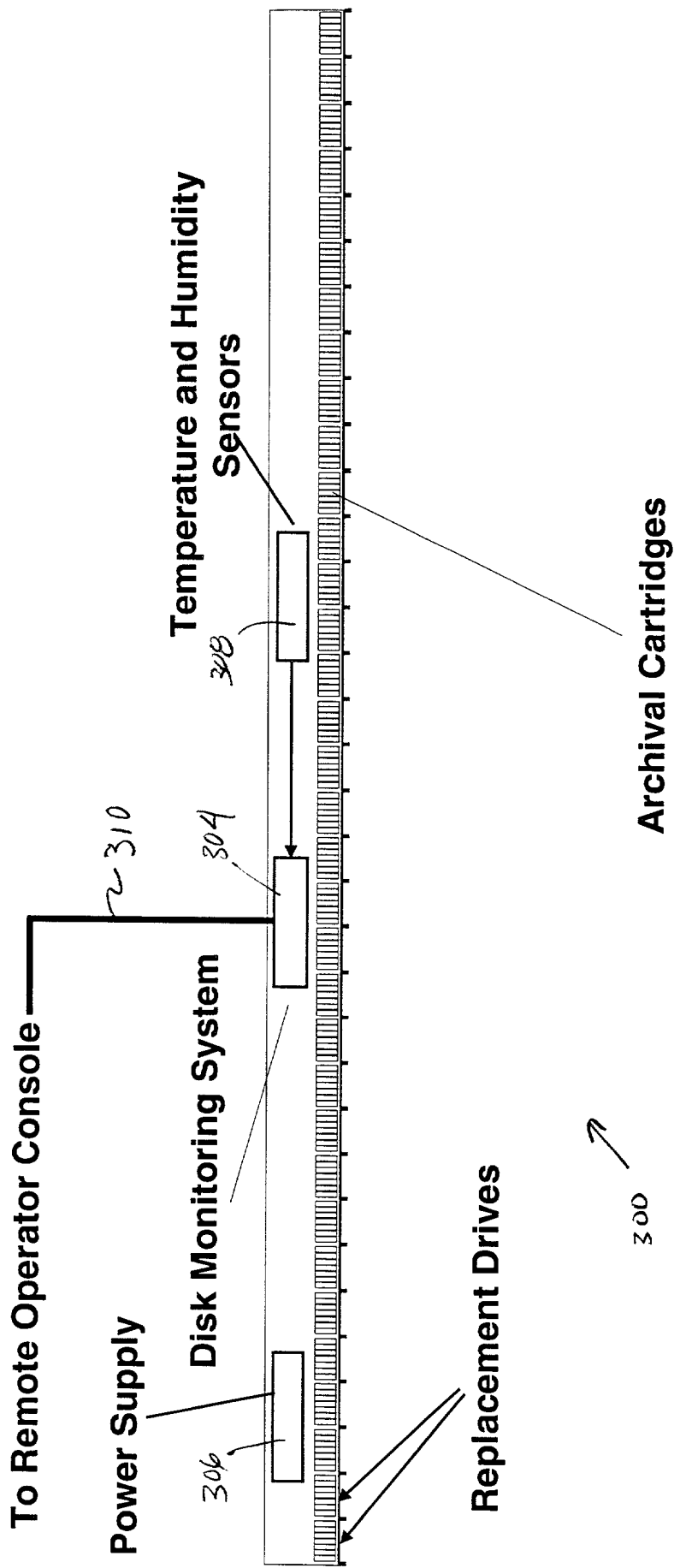
Figure 12

Disk Monitoring System

Power Disk Drive "A" on for 3 minutes — 352

Run SMART Test: Log Status — 354

FAIL → Backup Drive to one of a set of Spare Disk Drives Resident in Archival Storage Rack — 362
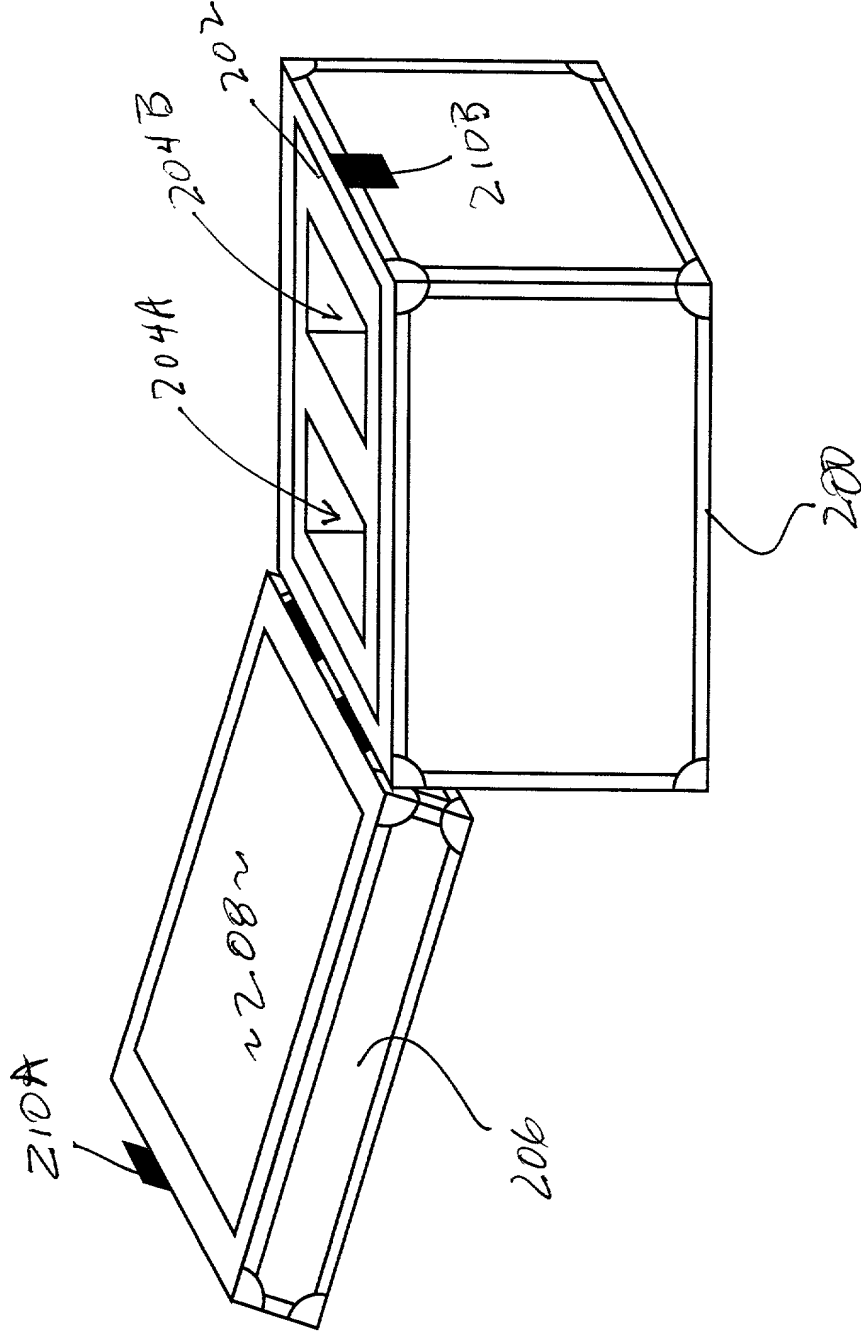
→ • Flash Failed Drive's LED
• Record Fail Message to Remote Operator Console for Drive Replacement — 364

→ Update Archive Records — 366

PASS → Power off Drive — 356

→ Reset Timer for Disk Drive "A" For 1 week in Cartridge Monitoring System — 358

→ Cartridge Monitoring System Advances to the next Disk Drive "B" — 360

350

Figure 13

BOM

EOM 404

maxlba

lba 0

Linked list of lbas

406 408 410 412

402

400

☐ Filemarks

☐ Dataspace

Figure 14

FileMark Block Structure

Byte	Description
0-7	Ascii "FILEMARK"
8	Major Version
9	Minor Version
10	Partition Number
11	Validily Byte 0 bit Mark Type 1 bit Previous filemark status 2 bit Next filemark status 3 bit Pervious filemark is Master Record
12-15	Previous FileMark LBA
16-19	Next FileMark LBA
20-23	Block Size
24-509	Reserved
510	Two-Complement Checksum bytes (0-509)
511	Two-Complement Checksum bytes (0-510)

Figure 15